Essroc San Juan
Carr. #2 KM. 26 BO Espionosa
Dorado, Puerto Rico 00646

Report

Performed Velocity, Moisture, Temperature, Volumetric Flow Rate, Metals, PM_{10}, Condensable Particulate Matter, Benzene, Hydrochloric Acid, $PM_{2.5}$, PAH^2 and Particulate Emissions Testing

Sampling performed on the Baghouse #2 Outlet

Dorado, Puerto Rico

Test Date: 07/10/2012 & 07/11/2012

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James K. Gray
Custom Stack Analysis, LLC.

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APPENDIX

EXECUTIVE SUMMARY

Custom Stack Analysis, LLC. conducted emissions sampling using USEPA Methods 1-4, 18, 29, 26A, 201A, 202 and 23. Testing was conducted on the Kiln Baghouse Outlet on July 10th and 11th, 2012 for performance purposes. The Custom Stack Analysis, LLC. test crew consisted of Mr. James Gray, Mr. Joe Crowe, Mr. Brian Lemasters and Mr. Leonel Figueroa. The testing procedures were coordinated by Ms. Beatriz Rivera Mercado of Essroc San Juan.

A description of the testing protocol is included on pages 7-14. All testing calculations are located on pages 21-35. Appendix 1 includes field test data. Appendix 2 contains laboratory data from Custom Stack Analysis, LLC., Columbia Analytical Services, Inc. and Data Analysis Technologies, Inc. Appendix 3 contains calibration data for the equipment used on test day. Test results are located on pages 2-6.

Test Results

Essroc San Juan - #2 Baghouse Outlet - Mill On
7/10/2012
Method 18 & 29

		Run #1	Run #2	Run #3	Avg.
Stack Gas Velocity (ft/sec)		98.04	99.40	97.63	98.36
Standard Cubic Feet an Hour		9,623,600	10,220,173	9,958,702	9,934,158
Actual Cubic Feet per Minute		245,639	249,046	244,634	246,440
Stack Temperature (F)		260	229	234	241
Moisture % (Measured)		8.32%	8.10%	8.22%	8.21%
Isokinicity %		98.2%	98.7%	100.3%	99.0%
Carbon Dioxide %		5.00%	5.00%	5.00%	5.00%
Oxygen %		15.00%	15.00%	15.00%	15.00%
Nitrogen %		80.00%	80.00%	80.00%	80.00%
Method 18					
Benzene	(µg/nm³)	0.38440	0.35999	0.36363	0.36934
Method 29					
Antimony	(mg/dscm)	3.36E-07	7.22E-08	1.90E-07	1.99E-07
	(µg/nm³)	3.36E-04	7.22E-05	1.90E-04	1.99E-04
	(lbs/hr)	2.52E-04	5.74E-05	1.47E-04	1.52E-04
Arsenic	(mg/dscm)	8.46E-04	7.92E-04	8.00E-04	8.13E-04
	(µg/nm³)	8.46E-01	7.92E-01	8.00E-01	8.13E-01
	(lbs/hr)	5.08E-04	5.05E-04	4.97E-04	5.04E-04
Cadmium	(mg/dscm)	1.08E-04	9.00E-05	8.00E-05	9.25E-05
	(µg/nm³)	1.08E-01	9.00E-02	8.00E-02	9.25E-02
	(lbs/hr)	6.47E-05	5.74E-05	4.97E-05	5.73E-05
Chromium	(mg/dscm)	8.34E-03	1.15E-03	1.38E-03	3.63E-03
	(µg/nm³)	8.34E+00	1.15E+00	1.38E+00	3.63E+00
	(lbs/hr)	5.01E-03	7.35E-04	8.59E-04	2.20E-03
Cobalt	(mg/dscm)	3.11E-04	1.37E-04	1.75E-04	2.08E-04
	(µg/nm³)	3.11E-01	1.37E-01	1.75E-01	2.08E-01
	(lbs/hr)	1.87E-04	8.73E-05	1.09E-04	1.28E-04
Copper	(mg/dscm)	6.38E-03	3.12E-03	1.08E-03	3.52E-03
	(µg/nm³)	6.38E+00	3.12E+00	1.08E+00	3.52E+00
	(lbs/hr)	3.83E-03	1.99E-03	6.69E-04	2.16E-03
Lead	(mg/dscm)	3.04E-03	5.72E-04	3.71E-04	1.33E-03
	(µg/nm³)	3.04E+00	5.72E-01	3.71E-01	1.33E+00
	(lbs/hr)	1.83E-03	3.65E-04	2.31E-04	8.08E-04
Manganese	(mg/dscm)	1.01E+01	1.37E+01	1.52E+01	1.30E+01
	(µg/nm³)	1.01E+04	1.37E+04	1.52E+04	1.30E+04
	(lbs/hr)	5.52E-03	7.21E-03	8.01E-03	6.91E-03
Mercury	(mg/dscm)	7.61E-03	5.33E-03	5.31E-03	6.08E-03
	(µg/nm³)	7.61E+00	5.33E+00	5.31E+00	6.08E+00
	(lbs/hr)	4.57E-03	3.40E-03	3.30E-03	3.76E-03
Nickel	(mg/dscm)	5.65E-03	1.66E-03	9.82E-04	2.76E-03
	(µg/nm³)	5.65E+00	1.66E+00	9.82E-01	2.76E+00
	(lbs/hr)	3.40E-03	1.06E-03	6.11E-04	1.69E-03
Thallium	(mg/dscm)	2.47E-03	1.34E-03	1.54E-03	1.78E-03
	(µg/nm³)	2.47E+00	1.34E+00	1.54E+00	1.78E+00
	(lbs/hr)	1.48E-03	8.55E-04	9.57E-04	1.10E-03
Vanadium	(mg/dscm)	1.11E-03	9.00E-04	1.09E-03	1.04E-03
	(µg/nm³)	1.11E+00	9.00E-01	1.09E+00	1.04E+00
	(lbs/hr)	6.70E-04	5.74E-04	6.78E-04	6.41E-04

Test Results

Essroc San Juan - #2 Baghouse Outlet - Mill On
7/10/2012
Method 23

	Run #1	Run #2	Run #3	Avg.
Stack Gas Velocity (ft/sec)	105.29	100.81	98.81	101.64
Standard Cubic Feet an Hour	10,542,551	10,551,650	10,363,976	10486059
Actual Cubic Feet per Minute	263,255	252,044	247,045	254114.72
Stack Temperature (F)	258	228	225	237.03
Moisture % (Measured)	6.55%	6.42%	6.55%	6.51%
Isokinicity %	96.1%	94.5%	95.7%	95.4%
Carbon Dioxide %	5.00%	5.00%	5.00%	5.00%
Oxygen %	15.00%	15.00%	15.00%	15.00%
Nitrogen %	80.00%	80.00%	80.00%	80.00%

METHOD CARB 429 - PAH Mill On

µg/nm³

Naphthalene	21.1430	5.3697	5.5722	10.6950
2-Methylnaphthalene	6.3943	7.6000	2.1839	5.3927
Acenaphthylene	0.0000	0.0000	0.0202	0.0067
Acenaphthene	0.3136	0.3641	0.1375	0.2717
Fluorene	0.5473	0.3631	0.1862	0.3655
Phenanthrene	1.6822	1.5139	0.7781	1.3247
Anthracene	0.0000	0.0917	0.0585	0.0501
Fluoranthene	0.3176	0.1673	0.0858	0.1903
Pyrene	0.3680	0.1332	0.0742	0.1918
Benzo(a)anthracene	0.0772	0.0021	0.0012	0.0268
Chrysene	0.0000	0.0073	0.0039	0.0037
Benzo(b)fluroanthene	0.0000	0.0077	0.0013	0.0030
Benzo(k)fluroanthene	0.0000	0.0000	0.0020	0.0007
Benzo(e)pyrene	0.0208	0.0030	0.0022	0.0087
Benzo(a)pyrene	0.0187	0.0016	0.0006	0.0070
Perylene	0.0065	0.0004	0.0003	0.0024
Indeno(1,2,3-c,d)anthracene	0.0000	0.0019	0.0012	0.0010
Dibenzo(a,h)anthracene	0.0246	0.0009	0.0009	0.0088
Benzo(g,h,i)perylene	0.0000	0.0027	0.0020	0.0016

Test Results

Essroc Method 26A Mill On - Baghouse Outlet
7/11/2012

		Run #1	Run #2	Run #3	Avg.
Stack Gas Velocity (ft/sec)		99.57	99.14	99.15	99.28
Standard Cubic Feet an Hour		10,145,636	10,153,889	10,108,417	10,135,980
Actual Cubic Feet per Minute		249,473	248,398	248,426	248,765
Stack Temperature (F)		237	232	239	236
Moisture % (Measured)		7.87%	8.06%	7.60%	7.84%
Isokinicity %		99.4%	96.8%	101.2%	99.1%
Carbon Dioxide %		5.00%	5.00%	5.00%	5.00%
Oxygen %		15.00%	15.00%	15.00%	15.00%
Nitrogen %		80.00%	80.00%	80.00%	80.00%
HCL	(lbs/hr)	2.178	2.237	2.140	2.185
	(lbs/dscf)	2.15E-07	2.20E-07	2.12E-07	2.16E-07
	(ppm)	2.277	2.337	2.245	2.286
	($\mu g/nm^3$)	3437.899	3528.341	3389.493	3451.911

Test Results

Essroc Method 201A & 202 Mill On - Baghouse Outlet
7/11/2012

		Run #1	Run #2	Run #3	Avg.
Stack Gas Velocity (ft/sec)		98.25	97.99	98.22	98.15
Standard Cubic Feet an Hour		9,856,191	10,049,498	10,006,942	9,970,877
Actual Cubic Feet per Minute		246,184	245,521	246,107	245,937
Stack Temperature (F)		245	229	232	235
Moisture % (Measured)		8.37%	8.39%	8.64%	8.47%
Isokinicity %		101.2%	98.0%	95.8%	98.3%
Carbon Dioxide %		5.0%	5.0%	5.0%	5.0%
Oxygen %		15.0%	15.0%	15.0%	15.0%
Nitrogen %		80.0%	80.0%	80.0%	80.0%
Cont. #1, ≤ $PM_{2.5}$					
Particulate	(lbs/hr)	6.5610	6.4388	6.1784	6.3928
Particulate	(gr/dscf)	0.0047	0.0045	0.0043	0.0045
Particulate	(lbs/dscf)	6.66E-07	6.41E-07	6.17E-07	6.41E-07
Particulate	(µg/nm³)	7,748.86	7,640.84	6,928.21	7,439.30
Cont. #2, > PM_{10}					
Particulate	(lbs/hr)	7.9440	8.6727	8.3826	8.3331
Particulate	(gr/dscf)	0.0056	0.0060	0.0059	0.0058
Particulate	(lbs/dscf)	8.06E-07	8.63E-07	8.38E-07	8.36E-07
Particulate	(µg/nm³)	9,382.20	10,291.75	9,399.89	9,691.28
Cont. #3, ≤ PM_{10} and > $PM_{2.5}$					
Particulate	(lbs/hr)	5.564	3.614	6.245	5.141
Particulate	(gr/dscf)	0.0040	0.0025	0.0044	0.0036
Particulate	(lbs/dscf)	5.65E-07	3.60E-07	6.24E-07	5.16E-07
Particulate	(µg/nm³)	6.57E+03	4.29E+03	7.00E+03	5.95E+03
Cont. #4, ≤ $PM_{2.5}$					
Particulate	(lbs/hr)	7.848	7.819	6.345	7.337
Particulate	(gr/dscf)	0.0056	0.0054	0.0044	0.0052
Particulate	(lbs/dscf)	7.96E-07	7.78E-07	6.34E-07	7.36E-07
Particulate	(µg/nm³)	9,512.07	9,278.17	7,115.46	8,635.23
Totals					
Particulate	(lbs/hr)	27.9166	26.5438	27.1517	27.2041
Particulate	(gr/dscf)	0.0198	0.0185	0.0190	0.0191
Particulate	(lbs/dscf)	2.83E-06	2.64E-06	2.71E-06	2.73E-06
Particulate	(µg/nm³)	33,214.46	31,498.98	30,446.67	31,720.04
Condensable Particulate Matter	(lbs/hr)	6.6575	7.7200	6.0706	6.8160
Condensable Particulate Matter	(gr/dscf)	0.0047	0.0054	0.0042	0.0048
Condensable Particulate Matter	(lbs/dscf)	6.75E-07	7.68E-07	6.07E-07	6.83E-07
Condensable Particulate Matter	(µg/nm³)	7,862.81	9,161.21	6,778.41	7,934.15

Test Results

Essroc Method 201A & 202 Mill On - Baghouse Outlet
Method $PM_{2.5}$ - 12/15/2011

	Run #1	Run #2	Run #3	Avg.
Cont. #1, ≤ $PM_{2.5}$				
Particulate (lbs/hr)	6.561	6.439	6.178	6.393
Particulate (gr/dscf)	0.0047	0.0045	0.0043	0.0045
Particulate (lbs/dscf)	6.66E-07	6.41E-07	6.17E-07	6.41E-07
Particulate (µg/nm³)	7,748.86	7,640.84	6,928.21	7,439.30
Cont. #4, ≤ $PM_{2.5}$				
Particulate (lbs/hr)	7.848	7.819	6.345	7.337
Particulate (gr/dscf)	0.0056	0.0054	0.0044	0.0052
Particulate (lbs/dscf)	7.96E-07	7.78E-07	6.34E-07	7.36E-07
Particulate (µg/nm³)	9,512.07	9,278.17	7,115.46	8,635.23
Total $PM_{2.5}$				
Particulate (lbs/hr)	14.409	14.257	12.524	13.730
Particulate (gr/dscf)	0.0102	0.0099	0.0088	0.0096
Particulate (lbs/dscf)	1.46E-06	1.42E-06	1.25E-06	1.38E-06
Particulate (µg/nm³)	17,260.93	16,919.01	14,043.67	16,074.53
D_{50} $PM_{2.5}$	2.483	2.500	2.576	2.520

Test Results

Essroc Method 201A & 202 Mill On - Baghouse Outlet
Method PM_{10} - 12/15/2011

	Run #1	Run #2	Run #3	Avg.
Cont. #1, ≤ $PM_{2.5}$				
Particulate (lbs/hr)	6.561	6.439	6.178	6.393
Particulate (gr/dscf)	0.0047	0.0045	0.0043	0.0045
Particulate (lbs/dscf)	6.66E-07	6.41E-07	6.17E-07	6.41E-07
Particulate (µg/nm³)	7,748.86	7,640.84	6,928.21	7,439.30
Cont. #3, ≤ PM_{10} and > $PM_{2.5}$				
Particulate (lbs/hr)	5.564	3.614	6.245	5.141
Particulate (gr/dscf)	0.0040	0.0025	0.0044	0.0036
Particulate (lbs/dscf)	5.65E-07	3.60E-07	6.24E-07	5.16E-07
Particulate (µg/nm³)	6,571.34	4,288.23	7,003.11	5,954.22
Cont. #4, ≤ $PM_{2.5}$				
Particulate (lbs/hr)	7.848	7.819	6.345	7.337
Particulate (gr/dscf)	0.0056	0.0054	0.0044	0.0052
Particulate (lbs/dscf)	7.96E-07	7.78E-07	6.34E-07	7.36E-07
Particulate (µg/nm³)	9,512.07	9,278.17	7,115.46	8,635.23
Total PM_{10}				
Particulate (lbs/hr)	19.973	17.871	18.769	18.871
Particulate (gr/dscf)	0.01418	0.01245	0.01313	0.01325
Particulate (lbs/dscf)	2.03E-06	1.78E-06	1.88E-06	1.89E-06
Particulate (µg/nm³)	23,832.27	21,207.24	21,046.77	22,028.76
D_{50} PM_{10}	10.670	10.753	10.930	10.784
Total PM_{10} & CPM				
(lbs/hr)	34.5741	34.2639	33.2223	34.0201
(gr/dscf)	0.0246	0.0239	0.0232	0.0239
(lbs/dscf)	3.51E-06	3.41E-06	3.32E-06	3.41E-06
(µg/nm³)	41,077.28	40,660.20	37,225.08	39,654.18

METHOD 1

Sample and velocity traverses for stationary sources.

To aid in the representative measurement of pollutant emissions and/ or total volumetric flow rate from a stationary source, a measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. A traverse point is then located within each of these equal areas.

METHOD 2

Determination of stack gas velocity and volumetric flow rate.

The average gas velocity in a stack is determined from the gas density and from measurement of the average velocity head with a Type S (Stausscheibe or reverse type) pitot tube.

METHOD 3

Gas analysis for the determination of dry molecular weight.

This method is applicable for determining carbon dioxide and oxygen concentrations and dry molecular weight of a sample from a gas stream of a fossil-fuel combustion process.

METHOD 4

Determination of moisture content in stack gases.

A gas sample is extracted at a constant rate from the source. It is determined either volumetrically or gravimetrically.

METHOD 18 TESTING DESCRIPTION

The major organic components of a gas mixture are seperated by gas chromatography (GC) and individually quantitified by flame ionization, photoionization, electron capture, or other appropriate detection principles. For the following testing conducted at the Tyler Pipe Company Triethylamine was the compound for sample collection and analysis. A pre-survey was conducted on each source in order to determine the approximate concentrations of the gas stream. The analyst then used this information in order to prepare standards to calibrate the GC under conditions identical to those of the samples. The following testing conducted used the absorption tube procedure with XAD-7 media. Referencing OSHA/PV2060. All pumps were calibrated with a bubble tube flowmeter through the a XAD-7 absorption tube blank before sampling. The ambient temperature and barometric pressure were recorded during pump calibration. During sampling a rotometer was used in order to verify the the sampling rate remained constant. A sample probe was used in order to obtain the sample at the centroid of the duct. During sampling the time, barometric pressure and ambient temperature were recorded. The following samples were collected at a sample rate of .2 l/min for 60 minutes with a total sample volume of 12 liters. A recovery study was conducted for the absorption tube procedure. Two identical trains were set up with one being designated the spiked train and the other unspiked. The mass of each spiked compound shall be 40 to 60 percent of the mass expected to be collected with the unspiked train. The samples were collected simultaneously.

METHOD 23 TESTING DESCRIPTION

Polychlorinated dibenzo-p-dioxins (PSDD's) and polychlorinated dibenzofurans (PCDF's) samples were collected following EPA Method 23. Each point will be sampled for 20 minutes for a total of a 240 minute test. The equipment used for testing consisted of a Burrell Model B orsat analyzer and a Alliance Pollution Control Stack Train Sampler (EPA type). A type "S" pitot and a heated sampling probe was used with the sampling train. All equipment was calibrated in the laboratory prior to the test. The sampling nozzle and the pitot tubes were measured on the day of the test. All calibrations can be found in the appendix. The gases passed through a heated glass probe and a heated glass four inch filter holder containing Gelman Type A-E fiberglass filter media. The gases leaving the filter passed through a cooling condenser to an XAD-2 sorbent trap. The condenser and the XAD-2 trap are kept below 68 degrees F by a pump circulating water. Once the gases passed through the trap they were collected in a series of four impingers packed in ice. The first, second, and fourth impingers were the modified Greenburg-Smith type and the third one was a standard Greenburg-Smith type. The first impinger is left empty. The second and third impinger contained 100 ml of distilled water. The fourth impinger is left empty. After leaving the fourth impinger the gases passed through a "Drierite" column containing about 500 grams of calcium sulfate (CaSO4) desicant to remove any remaining water vapor. The dry gas then passed through the hose portion of the umbilical cord to an Alliance Pollution Control "Stack sampler" module. In the module the gas is moved through the system by a leakless air pump to a Rockwell 175-S dry test meter. The dry test meter exhaust to a calibrated orifice to measure the flow rate of the gases passing through the sampling apparatus. A type "S" pitot tube was attached to the sheath of the heated probe and nozzle. The orifice pressure taps and the pitot tube are connected to a Dwyer dual 10 inch combination inclined-well type manometer. One half of the manometer measures the orifice differential pressure (^H) and the other half measured the flue gas velocity head (^P). The temperature of the flue gas was measured by a type "K" thermocouple connected to a Marlin digital temperature controller. The C02 and 02 levels are determined using a Burrell "Indurstrial" Model B orsat analyzer.

The XAD-2 resin will be charged with 20 to 30 grams of the precleaned resin. Care will be taken to ensure that the resin is kept at temperatures below 120 degrees farenheit before and after the sample collection to prevent resin decomposition. The period of time between charging the trap and us in the field will be minimized and will not be allowed to exceed 14 days.

Sample recovery will be conducted according to USEPA Method 23 section 4.2.

METHOD 26A TESTING DESCRIPTION

Samples were collected following EPA Method 26A. The equipment used for testing consisted of a Burrell Model B orsat analyzer and a Custom Stack Analysis Sampling Apparatus (EPA type). A type "S" pitot and a heated sampling probe was used with the sampling train. All equipment was calibrated in the laboratory prior to the test. The sampling nozzle and the pitot tubes were measured on the day of the test. All calibrations can be found in the appendix. The gases are passed through a heated pyrex probe and a heated glass four inch filter holder containing Pallflex TX40H145 filter media. The gases leaving the filter were collected in a series of six impingers packed in ice. The first, second and third impinger shall be of the Greensburg-Smith design with a standard tip. The first two impingers contained 100 ml of 0.1 N H_2SO_4. The next impinger contained 100 ml of 0.1 N NaoH and the last impinger was left empty. After passing through the fourth impinger the gases pass through a "Drierite" column containing about 500 grams of calcium sulfate (CaSO4) desicant to remove the remaining water vapor. The dry gas then passed through the hose portion of the umbilical cord to a Custom Stack Analysis Model #3000 stack sampling module. In the module the gas was moved through the system by a leakless air pump to a Rockwell 175-S dry test meter. The dry test meter exhausted to a calibrated orifice to measure the flow rate of the gases passing through the sampling apparatus. A type "S" pitot tube was attached to the sheath of the heated probe and nozzle. The orifice pressure taps and the pitot tube were connected to a Dwyer dual 10 inch combination inclined-well type manometer. One half of the manometer measured the orifice differential pressure (^H) and the other half measured the flue gas velocity head (^P). The temperature of the flue gas was measured by a type "K" thermocouple connected to a Marlin Digital Temperature Indicator. The $C0_2$ and 0_2 levels were determined using a Burrell "Industrial Model B orsat analyzer.

Sample recovery was performed according to USEPA Method 26A section 6.2.

METHOD 29 TESTING DESCRIPTION

Samples were collected following EPA Method 29. Each point was sampled for 10 minutes for a total of a 120 minute test. The equipment used for testing consisted of a Burrell Model B orsat analyzer and a Alliance Pollution Control Stack Train Sampler (EPA type). A type "S" pitot and a heated sampling probe was used with the sampling train. All equipment was calibrated in the laboratory prior to the test. The sampling nozzle and the pitot tubes were measured on the day of the test. All calibrations can be found in the appendix. The gases are passed through a heated pyrex probe and a heated glass four inch filter holder containing Gelman Type A-E fiberglass filter media. The gases leaving the filter were collected in a series of six impingers packed in ice. The first, second, fourth, fifth, and sixth impingers were the modified Greenburg-Smith type and the third one was a standard Greenburg-Smith type. The first impinger is left empty. The second and third impinger contained 100 ml each of HNO_3 / H_2O_2. The gases then pass through the fourth impinger which is left empty. After leaving the fourth impinger the gases passed through a fifth and sixth impinger containing 100 ml each of acidified KMnO4. They then pass through a "Drierite" column containing about 500 grams of calcium sulfate (CaSO4) desicant to remove any remaining water vapor. The dry gas then passed through the hose portion of the umbilical cord to an Alliance Pollution Control "Stack Sampler" module. In the module the gas was moved through the system by a leakless air pump to a Rockwell 175-S dry test meter. The dry test meter exhausted to a calibrated orifice to measure the flow rate of the gases passing through the sampling apparatus. A type "S" pitot tube was attached to the sheath of the heated probe and nozzle. The orifice pressure taps and the pitot tube were connected to a Dwyer dual 10 inch combination inclined-well type manometer. One half of the manometer measured the orifice differential pressure (^H) and the other half measured the flue gas velocity head (^P). The temperature of the flue gas was measured by a type "K" thermocouple connected to a Marlin digital temperature controller. The $C0_2$ and 0_2 levels were collected into teddlar bags and brought back to the laboratory for orsat analysis. Sampling train recovery was conducted as follows: Container No. 1 contained the filter. Container No. 3 contained the probe nozzle, probe fitting, probe liner, and front half of the filter holder with 100 ml of 0.1 N HNO_3. Container No. 4 consisted of impingers 1 through 3, connecting glassware and back half of filter holder being rinsed with 100 ml of 0.1 N HNO_3. Container No. 5A was the fourth impinger being rinsed with 100 ml of 0.1 N HNO_3. Container No. 5B consisted of the fifth and sixth impinger with acidified $KmnO_4$ being rinsed three times with a total of 100 ml of acidified $KmnO_4$. They are then rinsed with 100 ml of water. Container No.

METHOD 29 TESTING DESCRIPTION CONT.

5C was the fifth and sixth impinger being rinsed with 25ml of 8 N HCL to remove any remaining deposits. The container is initially filled with 200 ml of water. Container No. 6 contains the spent calcium sulfate. Container No. 8A contained 300 ml of 0.1 N Nitric acid solution used in the sample recovery. Container No. 8B contained 100 ml of distilled water used in the sample recovery. Container No. 9 contained 200 ml of fresh $Hn0_3/H_2O_2$ solution that was used in the impingers. Container No. 10 contained 100 ml of fresh acidified potassium permanganate solution. Container No. 11 contained 200 ml of distilled water plus 25 ml of 8N HCL. Container No. 12 contained 3 unused blank filters from the same lot as the sampling filters.

METHOD 201A TESTING DESCRIPTION

This method applies to the in-stack measurement of particulate matter (PM) emissions equal to or less than aerodynamic diameter of nominally 10 um (PM_{10}) from stationary sources. A gas sample is extracted at a constant flow rate through an in-stack sizing, which separates PM greater than PM_{10}. Variations from isokinetic sampling conditions are maintained within well defined limits. The particulate mass is determined gravimetrically after removal of uncombined water. Container number one consists of the in stack filter. Container number two is optional and consists of the large PM catch that is collected from the interior surfaces of the nozzle and cyclone, excluding the "turn aournd" cup and the interior surfaces of the exit tube. Container number three consists of the PM_{10} that is recovered from the cyclone exit to the front half of the in stack filter holder, including the "turn around" cup inside the cyclone and the interior surfaces of the exit tube. Container number four consists of the silica gel.

METHOD 202 TESTING DESCRIPTION

Particulate and condensable samples were collected following EPA Method 202. Three 60 minute test repetitions were performed. The equipment used for testing consisted of a Custom Stack Analysis Stack Train Sampler (EPA type). A type "S" pitot and a heated sampling probe were used with the sampling train. All equipment was calibrated in the laboratory prior to the test. The sampling nozzle and the pitot tubes were measured on the day of the test. All calibrations can be found in the appendix. The dust laden gases are passed through a heated Pyrex probe and a heated glass elbow to a condenser, two knock out impingers that are left dry, CPM filter between second and third impinger. The First and second impinger are immersed in a cold water bath while the third and fourth are in a ice water bath. The second, third and forth impingers were the modified Greenburg-Smith type and the first impinger was a short modified Greenburg-Smith type. The first and second impinger are empty. The third contains 100 ml water. The fourth empty impinger contains a "Drierite" column containing about 500 grams of calcium sulfate (CaSO4) desicant to remove any remaining water vapor. The dry gas then passed through the hose portion of the umbilical cord to a Custom Stack Analysis Model #3000 "Stacksampler" module. In the module the gas was moved through the system by a leakless air pump to a Rockwell 175-S dry test meter. The dry test meter exhausted to a calibrated orifice to measure the flow rate of the gases passing through the sampling apparatus. A type "S" pitot tube was attached to the sheath of the heated probe and nozzle. The orifice pressure taps and the pitot tube were connected to a Dwyer duel 10 inch combination inclined-well type manometer. One half of the manometer measured the orifice differential pressure (^H) and the other half measured the flue gas velocity head (^P). The temperature of the flue gas was measured by a type "K" thermocouple connected to a Marlin Digital Temperature controller. The $C0_2$ and 0_2 levels were analyzed using a Bacharach Fyrite. All the sampling train glassware was cleaned prior to the test with soap and tap water, and rinsed using tap water, acetone, and finally, Hexane. All the silicone grease was removed from the train. At the conclusion of the test run the post-test nitrogen purge was ran at 14 liters/min. During sample recovery the impinger contents are measured to within 1ml and placed in a container labeled CPM No. 1. The impingers including probe extensions are then rinsed twice with water and placed in container CPM No. 1. The impingers including probe extensions are then rinsed with acetone once and Hexane twice and placed in container No. 2. CPM container contains the CPM filter. CPM container #4 contains cold impinger water. CPM container No. 6 contains the acetone blank with acetone 150 ml. Container No. 7 will have 150 ml of water placed in it as a blank. The sample are then determined for the organic and inorganic fractions.

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